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Boosts for Basic Science and CivilianPrograms

R&D Budget: In a Time of Tight Money, Not So Bad

In difficult budget circumstances, the President last week proposed relatively generous servings of money for science and technology in the coming fiscal year: 8 percent more for basic research, a 7 percent increase in civilian R&D, but a mere 1 percent increase for defense R&D, and additional funds for industrial technology.

Of particular note in this budget is the continuing move toward largescale R&D programs that transcend federal bureaucratic boundaries and often involve a dozen or more agencies. Labeled "Presidential Initiatives," there are five of them, all involving big and growing budgets for R&D in areas of keen political and economic interest:

High-Performance Computing and Communications, up 23 percent, to $803 million.

Advanced Materials and Processing, up 10 percent, to $1.8 billion.

Biotechnology, up 10 percent, to over $4 billion.

Global Change, up 24 percent, to $1.37 billion.

Mathematics and Science Education, up 7 percent, to $2.1 billion.

Given that this is an election-year budget from a President low in the polls, the overall Bush spending plan appears bound for a mauling from a hostile Congress. But the odds are that the R&D segment—$76 billion out of $1.5 trillion—will not be radically altered. Many major parts of the R&D budget are multi-year ventures that, once started, gain political constituencies and momentum that assure their continuation.

Dingell Back on Overhead Trail—P.3

Q&A With NSF Director Massey—P.4

The Democratic Congress can thus be expected to go along with the great majority of the President's research-related proposals, and probably even exceed some of them in areas it strongly favors. Prominent among them is R&D for industrial rejuvenation, long supported by Congressional Democrats, initially ignored by the Bush White House, but increasingly in favor there since the departure of Chief of Staff John Sununu.

The major new force in budget politics is an amalgam of enduring recession and a zest for shifting funds from defense to civilian needs as an economic elixir. The budget proposed by the President was written under the two-year-old budget-summit rules that compartmentalized military, civilian, and foreign-assistance spending and set up a zero-sum system for increases within each category. The budget now submitted by Bush therefore doesn't reflect a possible yield from raids on the Pentagon. But the budget rules appear destined to be swept aside in this session of Congress, loosening funds for non-defense purposes.

There are many claimants for whatever money can be diverted from the Pentagon. But science and technology are held in high esteem on Capitol Hill and among the public. An often-stated theme at Congressional hearings is that science is one of the few remaining areas of decisive US supremacy—and let's keep it that way. The motivation is not cultural affection for knowledge, but faith and hope in

(Continued on Page 2)

In Brief

Tired, relatively poor, and highly employable, senior White House staff members customarily bail out in large numbers in the final year of a Presidential term—and the rumors are flying, including, as stated in the January 3 issue of Science, *that Presidential Science Adviser D. Allan Bromley "is not expected to stick around for 4 more years in the White House." Bromley's comment: "The published reports are remarkably premature."*

On the whisper circuit, the latest embellishment is that in a second Bush Administration, Bromley would be succeeded by NIH Director Bernadine Healy, who did a spell as No. 2 in the Reagan White House Science Office.

Since his friends, underlings, and would-be authors won't tell him, the gritty task falls to SGR: Editor Daniel E. Koshland's editorials in Science *reflect a bubblehead mentality that demeans the journal and diminishes the profession's credibility in public affairs. The latest (January 17, "The Attractiveness of Gloom") carries the words of Koshland's labored creation, "Dr. Noitall" [get it?], who says that "we doom-and-gloomers require more ingenuity to keep pessimism flourishing....[and] Some people enjoy gloom."*

That's not quite up to Koshland's editorial celebration of science in the Gulf War (February 1, 1991). Though it was the most tightly censored conflict in American history, Koshland credited science for an "enormous increase in public information" and a capacity to "spare, insofar as possible, the civilian population"—to which he added that science "can remove some of war's barbarities." He hasn't commented on the child-killing epidemics sweeping Iraq as the result of war damage to sewage and water facilities.

. . . Pentagon Still Gets Biggest Share of R&D Funds

(Continued from Page 1)
the economic value of science.

The explanatory materials accompanying the Bush budget echo that theme, with the introduction to the R&D section of the budget crediting the Bush Administration with "a pattern of investment in areas of research and development that will help to boost productivity and improve economic performance."

The President's 1993 budget plan, for the fiscal year starting next October 1, calls for $76.6 billion for research and development. Within that sum, military R&D still gets the lion's share—about $46 billion, or 60 percent, virtually unchanged from last year. But in percentage terms, defense R&D has been steadily dropping from its long dominant position in federal R&D allocations, where, in the mid-Reagan years, it took over 70 percent of the total.

At a budget briefing on January 29, Presidential Science Adviser D. Allan Bromley repeatedly said the Administration is committed to basic research and the solo basic researcher. The proposed 8 percent increase, he said, would bring federal basic-research spending to $14.3 billion. During Bush's three years in office, Bromley said with evident pride, support for basic research has risen by 35 percent—a hefty gain, in view of budget rules that generally limit domestic increases to the rate of inflation.

"Real increases in civilian R&D," Bromley added, "have therefore had to be matched by real decreases in other areas of non-defense domestic spending, even though these other areas have very active and vocal constituencies."

Though Congress will work its will on the budget, shifting funds and cutting out and putting in items, the final verdict—usually late in the summer—will be basically along the lines proposed by the President. Here's a rundown of major items:

Defense. The budget calls for only a 1 percent increase in defense R&D, of which $2.6 billion is provided through nuclear weapons programs in the Department of Energy. Basic research in DoD is slated for a 3 percent increase, to $1.2 billion—disappointingly small for academics who have long urged the Pentagon to pay up for its share of science. The resurgent Strategic Defense Initiative, budgeted for $5.4 billion, a $1 billion increase, is likely to be a major target for budget switchers.

National Institutes of Health. The Bush budget calls for increasing NIH research funding by 5.5 percent, a low figure that Congress can confidently be expected to raise by at least a couple of percentage points. Bromley stressed that at NIH, as at other agencies that provide grants for academic researchers, emphasis was given to supporting individual researchers.

National Science Foundation. The Administration takes credit for proposing an 18-percent boost, to $3.03 billion, a figure that definitely puts NSF in the big league of federal spending. An analysis by the House Science, Space, and Technology Committee says a proposed shift of $60 million in Antarctic logistical support from the Pentagon back to NSF would reduce the gain to 13 percent. Notable in the NSF budget is what isn't there—money for campus research facilities. For the second straight year, the Bush budget omits that item, on the grounds that pork-barrel earmarking of construction funds now totals nearly $1 billion. Lacking a clear picture of the impact of these funds, the budget states, the Administration prefers to withhold additional construction funds.

NASA. The Space Station, which survived a wipeout attempt in the House last year, is budgeted for a 10-percent increase, which would give it $2.25 billion of the $15 billion requested for the space agency. With the total NASA budget rising by only 5 percent, the Administration proposes to reduce funds for planetary exploration by $49 million, to a total of $487 million. Among the few new starts in space would be "two small, low-cost, robotic exploration missions to the Moon" as part of a "long-term plan to send people to Mars." Also proposed is a nearly three-fold increase, to $250 million, for joining with the Defense Department in the development of an unmanned launch system "with several configurations, including a heavy-lift capability." The NASA budget also proposes $391 million for the Earth Observing System, an increase of $120 million over last year. And $80 million is sought for NASA's partnership with the Pentagon for the development of the National Aerospace Plane.

Agriculture. An essentially standstill budget is requested for the Agricultural Research Service—$711 million, an increase of $19 million. And it's even worse for the Cooperative State Research Service, which would decline from $440 million this year to $425 million in Fiscal 1993. Within the CSRS budget, the National Research Initiative, a two-year-old program of competitive research grants, would rise from $98 million this year to $150 million.

Energy. The General Science Program is budgeted for an increase of 12 percent, or $179 million, to a total of $1.6

(Continued on Page 3)

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Auditors Tell Dingell Stanford Owes US $231 Million

The overhead woes for much of big-league academe moved to higher levels of fiscal peril last week as federal auditors told Rep. John Dingell that the government is entitled to mammoth refunds.

"It is our opinion that Stanford owes the government $231 million for excessive amounts billed" for overhead, or indirect costs, on federally funded research projects from 1981-88, according to testimony by Fred J. Newton, Deputy Director of the Defense Contract Audit Agency. Dingell grimly prophesied that Stanford's final bill could exceed $300 million.

Newton added that "MIT owes the government $19 million for excessive amounts billed" for 1990 alone, and Penn State owes the government $6.4 million.

Another witness, J. Dexter Peach, from the General Accounting Office (GAO), cited lesser sums—mostly in the hundreds of thousands—that have been questioned at Harvard Medical School, UC Berkeley, and other institutions, and concluded: "While the magnitude of unallowable charges at each school varies, the problem of unallowable costs being charged to the government is systemic."

The GAO official noted that Harvard Medical School's request for an indirect-cost rate of 96 percent had been reduced to 63.5 percent by the Department of Health and Human Services.

The witnesses generally agreed that the problems arose from infrequent or non-existent government audits, combined with greedy practices at the universities—leading, Dingell said, to a spirit of "Let the good times roll."

The figures and allegations poured out January 29 at the third hearing on overhead costs held over the past year by Chairman Dingell and his Oversight and Investigations Subcommittee. Officials of government audit agencies were the only ones called to testify. But several of the tarred universities subsequently issued statements contending that the alleged overcharges mainly reflected retroactive cancellation of memorandums of understanding (MOU), i.e., agreements allowing deviations from standard rules.

Anticipating that argument, Newton said that MOUs could be legitimately cancelled if their provisions were in violation of regulations governing indirect-cost payments. At Stanford, the hardest hit institution in the indirect-cost inquiries, Navy auditors have cancelled 124 MOUs and reduced Stanford's overhead rate from 74 to 55.5 percent.

Another witness, Rear Admiral William C. Miller, the Chief of Naval Research, reported refunds of $2.2 million from Stanford, $778,000 from MIT, $168,700 from the National Academy of Sciences, and $480,000 from Columbia University. With audits still proceeding, the Admiral indicated that more money will be on the way.

Dingell, sensitive to charges that the affected universities have been victimized by retroactive rule changes, confronted that argument at the outset of the hearing, noting claims of "foul" by universities and academic lobbying organizations. "They argue that this recent round of audits and tough negotiations indicates that the federal government is now somehow welshing on a productive 50-year partnership between the universities and the federal government. That argument is just plain nonsense," Dingell contended, adding that "there never was an understanding that any university could burden the taxpayers with irrelevant, improper, and, in a number of cases, illegal charges in the name of science."

Cited among items charged as overhead costs of research were $8855 for dinner dances at Syracuse University, $3406 for limousine rentals for the board members at MIT, and $15,000 for Penn State's sponsorship of events at Hershey Amusement Park.

Still unclear at this point is whether the federal government will actually pursue the return of the many millions discussed at the hearing. For the moment, the rhetoric is threatening, and Dingell is unrelenting in egging the auditors on to greater discoveries. But where all this leads is far from certain.—DSG

Fiscal 1993 Budget

(Continued from Page 2)

billion. The big item in that account, the Superconducting Super Collider, would rise about 37 percent, from $485 million this year to $650 million, leaving only a 3 percent increase for other big-science physics projects. The House Science Committee's analysis notes that the "underlying assumption" for financing the SSC calls for $100 million "from other sources," understood to mean foreign contributors. The Committee states, however: "No specific sources for the $100 million were observed." While the Department of Energy can expect a "peace dividend" from the phasing out of nuclear-weapons production, the money saved is spoken for well into the future: cleanup of nuclear waste around the weapons plants, an open-ended undertaking, is budgeted for a 26 percent increase next year, to a total of $5.5 billion.

National Institute of Standards and Technology. A Democratic Congressional creation, fashioned from the venerable National Bureau of Standards, NIST was intended to go beyond the old Bureau's traditional role of technological collaboration with industry, and become an active industrial booster. Reagan ignored the legislative charge, and, initially, so did Bush, but NIST, at last, is emerging from malign neglect at the White House. The proposed budget calls for a $64 million increase, to a total of $310 million. Of that amount, $68 million—an increase of $20 million—is proposed for NIST's Advanced Technology Program, designed to promote industrial R&D collaborations. NIST's program of Manufacturing Technology Centers would rise slightly, to $18 million. The budget request also includes substantial funds for renovation of NIST's own lab facilities.

NSF Head Vows Strong Support for "Little Science"

Walter E. Massey, Director of the National Science Foundation since last March, occasionally invites a group of science writers for a free-form discussion. The latest, attended by half-a-dozen reporters, took place January 16. Following are excerpts, transcribed and edited by SGR.

•

***Q.** In its 40 years, the Foundation has been the home-base for "little science." Does NSF continue in that role or is it evolving to something else?*

Massey. No, it has to continue. Our core mission, *raison d'etre*, is to make sure that we continue to support that set of activities, and that we really keep the health and vitality of the academic research and education enterprise as strong as it is. NIH supports more research than we do in these institutions. But I think we're probably the only agency that has that role at its basic core. We're expected to do more than just support research. Our mission is to try to make sure that those institutions remain healthy. That's one of the biggest challenges we face. We carry out most of our business through those institutions. I just take for granted that that's the central part of our Foundation.

***Q.** NSF's education budget has rapidly grown to about one-fifth of the total budget. Are you concerned whether the Education Directorate has the resources to manage those resources?*

Massey. Yes, I'm very concerned, the [National Science] Board is concerned. The only modification I would make is that it is not a Directorate concern, it's a Foundation-wide concern. Because although the Budget for EHR [Education and Human Resources] has been growing greatly, the education and human resources activities are spread around the Foundation—I don't mean in terms of budget, but in terms of concern.

***Q.** Are you getting more FTEs [fulltime-equivalent staff]? There are concerns about whether it is possible, with a small staff in EHR, to do the kind of thing that you just talked about.*

Massey. We're getting some more FTEs, yes. But we're not going to get the increase in staff size that's going to correlate with the growth of the budget, which means we have to conduct our business differently. One of the things I was most surprised about when I came to the Foundation was to learn that the support budget didn't grow with the program and that the money is not fungible. The other side of getting very good budget support is that it presents a management problem. A lot of the reorganization we're carrying out aims to manage this growth in an environment in which we cannot expect the kind of staff growth that we'd like.

***Q.** Is the Foundation doing anything to help scientists in the ex-Soviet Union?*

Massey. We had cooperative agreements with the Soviet Union and I guess they extend now to the Russian Academy of Sciences. Joint programs, scientist to scientist. Important things, but not on a large scale. We haven't started a new program, but Marcel Bardon, the new head of the International Division, and other people in the Foundation and outside are right now in the middle of looking at what we might be doing differently, and what we might be doing on a more focused basis. The thing that's not clear to us now is where we can make the most difference. One of the advantages we have is a system of scientist and engineer contacts to build on. We want to use that to see where any investment we can make would make the most difference. But we don't have a program yet. I hope in the next month or so to have a recommendation about what we might do.

***Q.** The Investigations and Oversight Subcommittee on the House Science Committee is looking at NSF's manpower forecasts, wondering whether the shortage predictions were self-serving [SGR, September 15: "Scientist Shortage? House Committee Requests Data"]. Has this had an impact on the agency?*

Massey. It's very distractive. I don't think it's had an effect on the operation in a substantive sense. It takes up a lot of time. You get a request that asks for "any and all documents relating to—." It's so broad, so we send over boxes, literally, boxes of material. And it's sort of ongoing, and I don't know to what purpose. When I first arrived here, there were allegations of misconduct, perhaps even fraud, in the SRS [Science Resources Studies] Division, and I referred that to the Inspector General's Office [SGR, July 1, 1991: "NSF Wonders Whether It's Got a Scandal Brewing"]. They found no evidence of fraud. They found mismanagement, and we'll follow up on that. But nothing criminal and nothing even that violated ethical rules of the Foundation or the government. But we're still getting inquiries [from Congress] that become broader and broader, and we're responding.

***Q.** Where does NSF stand now on the issue of whether or not we face a shortage of scientists and engineers?*

Massey. I don't think the Foundation has a position.

***Q.** There has been testimony by Foundation officials in the past along the lines that we do face a shortage.*

Massey. Well, you've got to get very technical. I don't think that's true. I know that's not true, because we've looked at that. I don't think Erich [Bloch, previous NSF Director] or anyone ever testified that there was going to be a shortage. Based on some rough analysis here that was intended for other purposes, what was done was some fairly simple projections. These projections said that if this goes this way, if the number of graduates continue that way, and the demographics go this way, and the present trend lines go, you're going to have a mismatch between the future and the past.

But whether that's a shortage or not, I'm learning, is much more complicated when you try to build in economic

(Continued on Page 5)

. . . Not Shielded by "Palace Guard," Massey Says

(Continued from Page 4)

factors, market conditions, immigration, minorities and women, people going in and out of the marketplace. So, we are now funding research in those areas. We started a new program last year in the Social and Economic Sciences Division to fund research among people who should understand these kinds of things. And also, SRS inhouse is working with an Academy [National Academy of Sciences] Committee that has done a review of [NSF's manpower] operations and made a number of recommendations, and they are responding to those recommendations.

Q. *There have been rumors that you're being considered for other jobs, the presidency of Stanford, for example.*

Massey. I've been in contact with no one. Period. I came here with the intention of staying here. Certainly, I'm not going to leave now. My God, I just started. My name shows up all the time. This is not the first time this has happened. Every time there's a search for a [university] president, my name shows up. It's not unexpected. I'm not being immodest, but I'm fairly experienced and that shouldn't be surprising. I'm not surprised.

Q. *Along the way in your first year at NSF, have there been some disappointments?*

Massey. I shouldn't say disappointments. I've learned some things. One, these investigations came as a surprise. I'm not even sure what they're all about. I'm not even sure what they're for, because they ask for so much. Congressman Wolpe's committee, to be precise. And I just don't know what they're looking for. I found that the Foundation is pretty well managed. That's one side of it. I didn't come expecting to have to deal with a level of management issues like that.

The other thing is broader, more substantive: I'm finding out how difficult it is to really do planning long range, with the budget cycle and a budget process that's so uncertain. And that's just the nature of the beast, so it's not a complaint in that sense, but it's a difficulty. Even with the best of intentions on everyone's side, things are unpredictable. So, we will have a budget proposal that goes into Congress at a certain level and internally, we have to plan. We begin planning around the process, the scientific community begins anticipating. Well, that's not the budget we get back. It never is.

Q. *It's been written that there's a palace guard here that has you walled off from the rest of the Foundation. Do you want to discuss that?*

Massey. Sure. It's not true. Will [Lepkowski] wrote that [in *Chemical & Engineering News*, Dec.2, Jan. 6]. It's just not true.

Q. *Is there anything that would suggest that possibility?*

Massey. Yes, I guess so. I have two very competent assistants, one for science and technology, and the other general—executive assistant. And they're just very competent. They're very reliable. And I think some people don't know me. And so they may not realize my style. I'm very accessible, very open. But if you didn't know that, if you just saw the Director, then you might not know how to deal with that. So, it's understandable. I've been making more efforts to make it clear how I am. For example, today we'll have a brown-bag lunch. I've been having a series of those and just sort of randomly invite staff over all levels to come in and talk about what they like. I'll do more visiting and the like. We'll have an all-staff meeting at the end of this month to talk about our planning process.

One of the problems is that our building is not conducive to informal gatherings. I'm used to campuses, where you walk across the campus and people see you. You go to the cafeteria, you go to coffee, you eat lunch. And I didn't realize that perhaps in this job you may have to orchestrate interactions, because we don't have a cafeteria, we don't have a coffee shop. There's nowhere in the course of the day people will run into the Director.

Q. *The building in Ballston [in nearby Virginia, where NSF is expected to move next year] will have—.*

Massey. An atrium.

Q. *You've said you prefer to keep NSF in downtown Washington. The Board is against the move.*

Massey. GSA [General Services Administration, the federal housekeeping agency] is proceeding with the building. We have money in the budget this year. The position which I supported was that we would not move unless we had adequate money in the budget [to avoid diverting funds from other NSF functions]. I would not have wanted to move, and I've said that.

But I see all the reasons. This building is old. There's always something going wrong. We had floods, we had to send people home the other day. The phones go out, the elevators don't work. But being two blocks from the White House and next to OSTP [Office of Science and Technology Policy], and Congress is right in town, I think it's something we would have wanted. It looks like now we'll just have to move. I think we start in '93.

Q. *Have we entered into any new scientific agreements with Japan?*

Massey. We haven't signed any major new agreement. What we have done is agree to renew the umbrella agreement that we've had. Under that umbrella, we'll be continuing the programs and, hopefully, increasing them, especially to try to find ways to motivate more American researchers to go to Japan.

Right now we have more available positions than we have people who are willing to take them. One explanation is the job market. People don't go away because they're afraid they won't be competitive when they come back. Can we do something on that end? Can we have a program that makes it easier for people to come back to do research? They don't understand the Japanese culture and society. Can we do more on this side to prepare them?

NIH Sets Road Show to Discuss "Strategic Plan"

The National Institutes of Health plans to hold five meetings around the country in coming weeks to discuss its forthcoming NIH Strategic Plan, described by its originator, NIH Director Bernadine Healy, as "an expression of our "*ordo amorum*—an idea expressed by St. Augustine—the order of our loves, or, in short, our priorities."

That flowery touch is contained in a 17-page paper prepared for the meetings, "Framework for Discussion of Strategies for NIH."

Copies of the NIH "Framework" paper and information about the meetings are available from: Mary Demory, NIH Office of Science Policy and Legislation, Building One, Bethesda, Md. 20892; tel. 301/496-1454.

The meeting series starts with a by-invitation-only "national symposium" February 2-4, at the Southwest Foundation for Biomedical Research, San Antonio. This will be followed by four regional meetings, open to public attendance and participation, all starting around 8 am:

February 12, Los Angeles, Sheraton Los Angeles Airport Hotel, co-hosted by Occidental College and the Drew University of Medicine and Science.

February 25, University of Connecticut Health Center, Farmington.

March 3, Emory University, Atlanta.

March 5, Washington University, St. Louis.

The "Framework" paper states incontestable goals for NIH, e.g., "To provide the scientific base that will strengthen the Nation's capability to deliver more effective disease prevention and health care in order to enhance the quality of its citizens' lives." It goes on to "reaffirm the principle of high-quality investigator-initiated research as essential to discovery." And then it proceeds to bureaucratic imponderables that can keep the seminar, workshop, and task force industries humming indefinitely:

"Regardless of the budget levels, is it appropriate for areas designated as critical technologies to grow at a differential rate from the rest of the NIH budget?

"How do we identify differences in opportunities that could single out components within programs for special emphasis in resource allocation? What are the appropriate criteria to be applied?"

Included, too, among questions to be addressed at the meetings are several of the nettlesome scientific-political issues that have troubled NIH in recent years. Though there's no specific reference to the abortion issue or the enduring Reagan-era restrictions on transplantation research using fetal tissue from induced abortions, the topics are encompassed in an item under the heading "Public Trust."

"What is the appropriate role of the NIH," the "Framework" paper asks, "in dealing with broad social, legal, and ethical issues that touch on biomedical research? How should we engage these issues? Should we avoid them?"

Letters to the Editor

"Bio-Megalomania" Title for NIH Plan Wins Healy's Praise

It was a particular pleasure to receive the January 15 issue of *Science & Government Report* [containing excerpts from the forthcoming National Institutes of Health Strategic Plan, which, SGR suggested, reflects "Bio-Megalomania in Bethesda"]. We have been searching relentlessly for a title for the NIH Strategic Plan.

We were considering forming a committee to "consider virtually everything," but spared ourselves that "torpid pace." [Items quoted are from SGR's description of NIH's operating style]. We even thought of embarking on a community-wide naming contest. Had we done so, you surely would have been among the finalists with "NIH Strategic Plan: Bio-Megalomania in Bethesda?" If your title does not make the cut, it does deserve a prize for creativity, imagination, and euphony—and for recognition of the importance of biobehavior to the NIH.

Bernadine Healy
Director, Nat'l Insts. of Health

NSF Program is Not Hush Money

SGR [October 15] refers to the National Science Foundation's Experimental Program to Stimulate Competitive Research [EPSCoR] as "a system of hush money for states that fare poorly in competition for NSF grants ..." The editorial comment "system of hush money" suggests you have not had an opportunity to learn about EPSCoR. It is intended to assist the lowest states in federal R&D to become more competitive.

To accomplish this goal, they must show a significant state and industry cost-sharing and must compete in a rigorous, peer-review competition. The program has been strongly endorsed by the Association of American Universities, the National Association of State Universities and Land-Grant Colleges, and by D. Allan Bromley, the Assistant to the President for Science and Technology.

EPSCoR is, at present, the only credible response to the problem the scientific community is facing with pork-barreling and hush money.

Gene D'Amour
Vice President for Research
and Project Administration
Tulane University;
Chairman, Coalition of
EPSCoR States

More In Print: Manpower Studies, NIH Computers

(Continued from Page 8)

by means of the actors ... or by means of the spectators who mount the stage." More appropriate, given the budget gloom inspiring the zest for priorities, would be Samuel Johnson's remark: "When a man knows he is to be hanged in a fortnight, it concentrates his mind wonderfully."

Order from: Space Studies Board, National Research Council, National Academy of Sciences, 2101 Constitution Ave. NW, Washington, DC 20418; tel. 202/334-3477.

Supply and Demand in Science and Engineering, an occasional paper (91-4) by the Commission on Professionals in Science and Technology (34 pp., $20 for Commission members, $25 for non-members; quarterly subscriptions, $60 for members, $75 for non-members), says it's important to know whether S&E manpower supply and demand "are or will be in relative balance," and reports the basic manpower numbers provided by government agencies and professional societies. Conclusion: Strive for foresight, but recognize that "It is not possible to predict the future" because of unknowables about levels of economic activity, government spending, immigration, etc. A Washington-based non-profit, the Commission numbers some 60 scientific societies and corporate firms as members or sponsors.

Order from: Commission on Professionals in Science and Technology, 1500 Massachusetts Ave. NW, Suite 831, Washington, DC 20005; tel. 202/223-6995.

Grants for Science Education: 1991-1992 (88 pp., no charge), fourth annual report of the Office of Grants and Special Programs established by the Howard Hughes Medical Institute under the gun from the Internal Revenue Service to belt out more money from its multi-billion-dollar mother lode, previously confined to biomedical research. Since 1987, the report says, the program has awarded $167 million for graduate fellowships, undergraduate programs, and related activities "to attract excellent students to careers in biomedical research and teaching." Within the $50 million a year now budgeted for Grants and Special Programs, there's a new International Research Scholars Program, which last year awarded $10.5 million for 21 5-year awards for biomedical research in Mexico and Canada. The next round of awards will be devoted to the UK, Australia, and New Zealand.

Order from: Howard Hughes Medical Institute, Office of Grants and Special Programs, 6701 Rockledge Dr., Bethesda, Md. 20817; tel. 800/334-6301, ext. 412.

Preparation and Maintenance of Higher Mammals During Neuroscience Experiments (NIH Publication No. 91-3207; 45 pp., no charge), second printing of a report that has drawn wide interest in and beyond the neurosciences, according to co-editor Michael D. Oberdorfer, of the National Eye Institute, which joined with the National Institute of Mental Health in sponsoring the 1989 workshop on which the report is based. The aim, according to the introduction, is to assist researchers in interpreting the basic principles in the *National Institutes of Health Guide for the Care and Use of Laboratory Animals*, which the present report describes as specific about what's forbidden, but "only rather general about what is allowed."

Order from: Michael D. Oberdorfer, National Eye Institute, Building 31, Room 6A47, Bethesda, Md. 20892; tel. 301/496-5301.

Defense Industrial Base: Industrial Investment in the Critical Technologies (GAO/NSIAD-92-4; 12 pp., no charge), by the General Accounting Office (GAO), a look at the extent to which technologies deemed critical by the Pentagon are researched with the flexible funds provided to defense contractors under DoD's program of Independent Research and Development (IR&D) and a since-abolished program of Bid & Proposal funds. In fiscal 1990, the two programs provided $7.3 billion for 121 contractors, GAO found. Of this amount, $2.9 billion matched up with DoD's own Critical Technologies Plan.

Also from the GAO: ***Major NIH Computer System: Poor Management Resulted in Unmet Scientists' Needs and Wasted Millions*** (GAO/IMTEC-92-5), reports a mess in NIH's 1988 contract with IBM for a computer system to serve the biomedical research community—ultimate potential cost $806 million. NIH failed to identify researchers' needs, the report states, and wasted over $16 million on unneeded computers. "NIH's problems with its computer center result, in large part, from lack of leadership," the GAO asserts, adding that "oversight was virtually nonexistent when the total system procurement was planned."

Order from: USGAO, PO Box 6015, Gaithersburg, Md. 20877; tel. 202/275-6241.

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In Print: S&T in World Affairs, Space Priorities, Etc.

The publications listed are obtainable as indicated—not from SGR.

Science and Technology in US International Affairs (125 pp., no charge), from the Carnegie Commission on Science, Technology, and Government, another in its lengthy series of critiques of how the US government is organized for handling S&T issues. Inadequately or worse is the finding in all cases examined so far by the Commission, established in 1988 by the philanthropic Carnegie Corporation as a policy-research center and platform for elder statesmen of science and politics to declare their dismay and prescribe remedies. This study, derived from a workshop with the Council on Foreign Relations, reports "a crazy-quilt of poorly defined responsibilities, inconsistent strategies, and inadequate resources" for dealing with the international dimensions of S&T. In recommendations, great emphasis is given to strengthening and elevating science advice at the State Department—along with acknowledgement that similar suggestions have been ignored for decades. Sounding the paranoid theme that's increasingly evident in American public discourse, the report states, "The United States is the 'target' for S&T sharpshooting by many countries." Offered as evidence is that US science attaches abroad are far outnumbered by foreign counterparts in Washington, though SGR can attest that many foreign science attaches here seem uncertain of what's where and who's in charge of what in the vast US research enterprise and its government links. The report was "prepared principally" by Rodney W. Nichols, a member of the Commission's executive committee. Listed are the previous reports, all available without charge:

Science & Technology and the President.

E^3 : Organizing for Environment, Energy, and the Economy in the Executive Branch of the US Government.

New Thinking and American Defense Technology.

Science, Technology and Congress: Expert Advice and the Decision Making Process.

Technology and Economic Performance: Organizing the Executive Branch for a Stronger National Technology Base.

In the National Interest: The Federal Government in the Reform of K-12 Math and Science Education.

Science, Technology, and Congress: Analysis and Advice from the Congressional Support Agencies.

Order from: Carnegie Commission on Science, Technology, and Government, 10 Waverly Place, New York, NY 10003; tel. 212/998-2150.

Setting Priorities for Space Research: Opportunities and Imperatives (63 pp., no charge), from the Space Studies Board of the National Academy of Sciences, first leg of a long circumnavigation that started with pondering whether "the Board should attempt to develop a methodology for recommending priorities among the various initiatives in space research...." The answer, from a group chaired by John A. Dutton, Penn State, is yes, the Board should make the attempt. The report says priority-making is desirable and feasible, and even jousts with standard arguments against priorities, e.g., "The low-priority initiatives will not be done"—to which the Board replies that "if there are insufficient resources to do everything, it certainly seems preferable to abandon low-priority initiatives rather than to starve high-priority ones." Arguing that priorities will be made, haphazardly or deliberately, the report quotes Metternich: "[Policy] is like a play in many acts, which unfolds inevitably once the curtain is raised.... The play will go on, either

(Continued on Page 7)

The Shuttle's Real Costs

Excerpts from a report by the General Accounting Office, Space Shuttle: NASA Faces Challenges in Its Attempt to Achieve Planned Flight Rates *(GAO/NSIAD-92-32; 48 pp., no charge).*

NASA originally planned to launch the shuttle up to 60 times a year. Before the January 1986 *Challenger* accident, NASA reduced its maximum launch rate estimate to 24 times a year.... After the accident, NASA again revised its plan downward to a maximum of 16 shuttle flights a year.... As the number of shuttle flights decreased, the average cost per flight increased dramatically. Estimated costs have increased seven-fold from a June 1976 average of $50 million a flight when NASA projected flying the shuttle up to 60 times a year to a September 1991 estimate of $358 million each for the 8 flights conducted in fiscal year 1991.

NASA has reduced its projection of the maximum annual shuttle flight rate to 10 flights a year and does not anticipate flying at this rate before late in the decade.... Unless NASA can reduce shuttle ground processing time, GAO calculates that it will not be able to consistently launch the shuttle more than 7 or 8 times a year....

About 80 percent of the payloads listed on the shuttle's pre-*Challenger* manifest have either been canceled or shifted to expendable launchers. Of the 61 payloads still scheduled to fly on the shuttle between April 28, 1991, and September 30, 1996, 28 require a human presence, 26 require the unique capabilities of the shuttle, and 7 are included for "other compelling reasons." Most new payloads are being designed for launch on expendable vehicles.... NASA has established a flight assignment board to help assure that only payloads requiring the shuttle are on its manifest.

Order from: USGAO, PO Box 6015, Gaithersburg, Md. 20877; tel. 202/275-6241.